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of other natural dams; and these we find repeated between Khartum and Berber, below Abu-Hamed, between that and Dongola, and between Dongola and Wadi-Halfa. At the last-named place is found what is called the second cataract; and still farther down the course of the river, at Assuan, is the well-known 'first cataract.' Thence to the sea the course of the great river is unobstructed in its flow, except by the works of man. The great viceroy, Mehemet-Ali, caused, at immense cost, the construction of the famous *barrage du Nil* ('the dam of the Nile') a few miles to the north of Cairo, in the endeavor to make art complete, by a dam, what nature had so well done in Central Africa and Nubia for securing regular irrigating-supplies.

The cataracts which play so important a part in the preservation and regulation of the Nile flow, are formed by masses of granite rock, which at intervals cross the course of the stream, making enduring dams. It is easy to perceive, that, should they be worn away or destroyed, the flow of the river would be made much more rapid during the seasons of high water; and the Nile would become, in Nubia, a fierce torrent during high water, and a nearly dry channel for a considerable portion of the year.

The natural destruction of these great dams by the formation of pot-holes, and the friction of *débris* passing over them, is, from the nature of the rock, very slow. From such observations as have been made, it is probable that the natural wearing-away hardly exceeds six feet in one thousand years; and there is a corresponding effect in the natural rising of the river-bed below the cataracts and in the delta by the deposit of silt from the turbid waters.

The Nile is navigable at all seasons of the year, by steamboats of light draught, from the mouth to Assuan (the first cataract), between the first and second cataracts (Assuan to Wadi-Halfa), between near Berber and Khartum, between Khartum and a point a little to the south of Gondokoro, and between Duffli and Lake Albert. It is only during the season of high water that boats can descend the Nile, passing the cataracts between Berber and Assuan.

The great danger to boats descending these fierce rapids during high water is found in the eddies near the river-banks, islands, and large rocks. The current is so rapid, and the friction on either hand so great, that the water seems to *heap up* in mid-channel, where the current is the strongest; and great skill on the

part of the steersman, and prompt and vigorous work on the part of the engineer of the steamer, or oarsmen of a row-boat, are necessary to keep the boat on the ridge of the current. If the boat is permitted to slide off this ridge, she is quickly caught by the eddies, and almost invariably lost. This is so well understood by the Nubian boatmen, that, while they work with a will at the oars in these descents, they always have their personal effects packed in a snug parcel beside them, ready to seize; and they leap overboard, each with his parcel on his head, the moment the boat gets into a hopeless position.

The work of towing or warping boats up against the current is more difficult, but far less dangerous, than the descent.

CHAS. P. STONE.

#### A MUSSULMAN PROPAGANDA.

THE attention of geographers has of late been particularly attracted by the operations of a Mussulman confraternity known as the Sénousians, or the Brotherhood of Sidi Mohammed Ben Ali es-Senousi, the founder of the order. Of this now powerful and widely ramifying society, Henri Duveyrier has recently given an account. Its operations are of importance to civilization, not merely from the relation of this order to existing religions, but from that which it bears to the efforts being made by civilized nations to develop the dark continent, and explore its geographical and other mysteries. The success of the religious propaganda which the society represents menaces not only projected explorations, but the very existence of established colonies and international traffic. It is believed that to their instigation is due the melancholy fate of many African explorers of late years, among whom may be mentioned Dournous Dupéré, Beurmann, Von der Decken and his party, Col. Flatters, Capts. Masson and Diarnous, Dr. Guiard, Béringer, Roche, Mademoiselle Tinné, Sacconi, and others. If the present crusade in the Sudan be not wholly due to their machinations, it has at least been actively assisted and impelled by individual members of the society, and guided by the blind fanaticism which is its rule of conduct. The favorite motto of the head of the order declares Turks and Christians to be equally offensive, and doomed to an equal and simultaneous destruction. Their monasteries and influence extend from Morocco to Arabia, and from the Mediterranean to Mozambique, and govern two or three millions of peo-

ple. Under their teachings, peaceable blacks, who formerly welcomed trade and civilization, or did not oppose it, have become ferocious bigots; and large areas have thus been utterly closed to intercourse with the whites, unless accompanied by an army. A brief summary of the history and tenets of the fraternity will not be valueless.

Of the religious societies which have flourished in the bosom of Islam, the present is one of the latest, but, during the forty-seven years of its existence, has attained a far greater success than any of its predecessors.

Its founder was of the tribe of Medjaher, from the vicinity of Mostaghanem in Algeria, born during the last phases of the Turkish occupation, of which he was the declared adversary. Exiled to Morocco, he was initiated through the fraternity of Mulei Taiëb into the mystic philosophy known to orientalists as Chadheliya, or Chadhelism. He returned to his native land about the time that Algiers was taken by the French. He travelled as a teacher of law and philosophy through the highlands of Algeria, gradually making his way eastward toward the holy places of Arabia, attracted by the renown of the theologians gathered there, and especially of Ahmed Ben Edris, the patriarch of Chadhelism at Mecca. This philosophy was already tinctured with Wahabi radicalism; and in the course of his travels, stopping to give courses of instruction, and expound his views in various cities, he became equally obnoxious to the representatives of the established doctrines, and to the government of Egypt. Arrived at Mecca, he became first the pupil, then the successor, of the sheikh Ahmed Ben Edris. His first attempt to make converts in Yemen, on a journey with that end in view, was unsuccessful. He returned to Mecca, and addressed himself more particularly to the Berber pilgrims, to whom he taught what he called the 'way of Mohammed,'—a title afterward altered to the 'way of es-Senousi.' By this he intended a sort of reformed Chadhelism, partly drawn from the Korán and its commentators, and partly from his own meditations, which he presented to his pupils as the pure faith of Islam, disembarassed of the theological incrustations of twelve centuries of theologians. This religion was distinguished from the first by its claims to absolute authority; and the writings in which his views are summarized bear the pretentious title of 'The rising suns.' His resolution of forming a religious order bore fruit about 1837. The object of the fraternity was to teach the following doctrines, among others: the exaltation of

God, to whom worship is alone reserved; living saints may be venerated as permeated with the spirit of God, but this ceases with their death; their tombs must not be the goal of pilgrimage, nor their names used as intermediaries in prayer (even Mohammed forms no exception); the novice renounces the world, he will respect the authority of the caliph so long as the latter respects the society; political ambition must not be exercised against a true believer, but becomes a duty and a merit as against one who does not accept the true way, that is, the 'way of es-Senousi.'

Luxury and ornament are prohibited. Gold is reserved for the sword to be drawn in a holy war. Women, however, are excepted from these rules. Drunkenness, tobacco, and coffee are prohibited; tea allowed, if sweetened with brown sugar, the white sugar being impure, as refined by the use of bones of animals killed by unbelievers. It is forbidden to serve or to speak to a Christian or a Jew, or even to bow to them. Unless they are tributaries or slaves of believers, they are to be considered as outlawed enemies, to be robbed or killed at the most convenient opportunity. The society is allowed to fraternize with other Chadhelic orders,—a condition of great importance, and to which much of its success is due. Almost all the Mussulman orders which at first repudiated the new doctrine have come to acknowledge its supremacy, and to conform to its policy.

The fraternity maintains itself in mystery. The acolytes wear no distinguishing dress or mark, their rosaries are similar to those commonly in use, and the supplementary prayer which they add to the usual matin is communicated only to members of the order.

The society holds convocations, prescribes pilgrimages to its monasteries, levies a tax of two and a half per cent on the capital of its followers for the treasury of the order. Those too poor to contribute money or stock render service as laborers, artisans, emissaries, spies, or even assassins. All means are held good toward their desired end, even the arts of light women being employed in cases where ruder influences have been repulsed. The order administers justice to its followers and those under its influence. For instance: in the Ottoman vilayet of Ben-Ghazi, in Barca, the authorities have even gone so far as to depute the administration of justice to the order. In all north-eastern Africa except Egypt the Mussulman swears by 'the truth of Sidi es-Senousi,' as formerly by that of Mohammed. Mild when weak, the order becomes defiant

with secure establishment, and even dared, in 1861, to excommunicate the sultan, Abd el-Mejid, for failing to respect its pretensions.

The operations of the order are carried on by a system of graded officers, priests, and missionaries, which, as well as their adroit and varied methods, strongly recall the marvellous organization once attributed to the order of Jesuits. Nor has the result been less successful. Tribes alien and unreceptive, rulers cold or jealous, populations indifferent or contemptuous, have been won over and firmly attached to the order. The hard-worked native transfers his field to the society, preferring to lay up treasures in heaven. The fraternity digs wells in the desert, revives withered oases, protects its votaries from the nomad thieves of the Sahara, buys, instructs, and frees slaves, and sends them to their distant homes as missionaries, with astonishing results.

The headquarters of the order are at the zaouia, or convent, of Jarabub, founded in 1861, on the 30th parallel, near the western frontier of Egypt. Its population has increased marvellously during the last ten years. The place was originally a desert. The society built reservoirs, began plantations, erected convents; and in 1880 the body-guard of the head of the order was estimated to consist of four thousand men and about two thousand slaves. The metropolitan is the son of Sidi es-Senousi, whose genius he would appear to inherit, and is known as Sidi Mohammed el-Mahdi, having, like the false prophet of the Sudan, assumed, at his father's instigation, the title equivalent to a Moslem messiah. The convent has become an arsenal, possessing large stores of arms and ammunition, and even fifteen cannon purchased at Alexandria. Aid and comfort are lavishly extended to those who have from time to time revolted against France in Algeria.

Too wise to inaugurate as yet the holy war predicted of El-Mahdi, the head of the order has, nevertheless, provided against external aggression. Suspecting that its propaganda may eventually rouse the arms of civilization against it, it is said that there are constantly kept at the zaouia of Aziat in Cyrenaica, for example, five hundred camels with their harness and equipments, drivers, etc., ready at a moment's notice to convey to the interior the persons and property of the Senousian authorities. The fraternity possesses one of the best ports in North Africa, — Tobrug, — where an illegitimate trade flourishes, and does not want for manufactories of powder.

France is, so far, the only civilized nation

which has suffered directly from the policy of the order. In Algeria most of the rebellions of late years are attributed to the new propaganda. The insurrections there have been imitated in the French district of Senegal. We have already referred to the probable connection of the order with recent events in the Sudan.

We have refrained from entering into a multitude of details which support the preceding conclusions, and it is not necessary to recount the different tribes and petty African states which have gradually become converts to the views of the fraternity. Enough has been said, however, to indicate the unsuspected importance of this new factor in the politics of Africa. The blood of many explorers and travellers bears testimony to the violence of its fanaticism; and neither the geographer nor the anthropologist can regard with indifference a movement which falls little short of that which originally propagated the faith of Islam.

W. H. DALL.

#### THE RUBY-HILL MINES, EUREKA, NEV.

MR. J. S. CURTIS, whose report on the silver-lead deposits of Eureka, Nev., is now in press, has prepared for exhibition at the New-Orleans exposition, by the U. S. geological survey, a model of the Ruby-hill mines, from which the largest portion of the metals extracted in the Eureka district has been taken. This model is eighteen inches in height, and about four feet long by eighteen inches wide. It is composed of glass plates horizontally arranged at distances of one inch apart, each inch representing a hundred feet, and the glass plate showing a section at each mine-level in the body of the model, the mine-levels being that distance apart. The upper plates, however, are closer together, and are cut to show the contours of the surface at distances of fifty feet apart.

On these plates the geological formations, three in number (quartzite, limestone, and shale), all of the Cambrian period, are colored with transparent colors. The ore-bodies, occurring only in the limestone and of tertiary or pre-tertiary age, are very irregular in form, and are shown by opaque red paint; while the mine-workings, shafts, tunnels, etc., are represented in opaque black paint. The effect of the model is as though a skeleton of the mine-workings and ore-bodies were seen suspended in a solid glass mass, the coloring of the geological structure not interfering with the view, on account of its transparency.

The dominant factor of the structure of Ruby Hill is an extensive fault, which has determined the present relations of the formations. The presence of this fault is marked by a fissure filled in places with rhyolite. This fissure also forms the hanging-wall of the ore-zone. Above the water-level the ore is prin-